

The Effect of Post-Anesthesia Team Handover on Hypoxia in Post-Anaesthesia Care Unit (PACU)

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Abstract

Miscommunication in handover from the operating room to the Post-Anaesthesia Care Unit (PACU) often occurs and can cause diagnostic and therapeutic delays and trigger complications. One of the most frequent complications in the PACU room is Hypoxia. Post-Anaesthesia Team Handover (PATH) using SBAR is expected to reduce the incidence of hypoxia in the PACU, reduce handover interruptions, improve communication and information between health workers. The study aimed to determine the effects of Post Anesthesia Team Handover (PATH) on Hypoxia in Post-Anaesthesia Care Unit (PACU). This study used a pre-posttest quasi-experimental design with a control group. Purposive sampling was applied to recruit 68 respondent to participate in the study. There was a significant difference between the hypoxia before and after the use PATH with SBAR in the intervention group compared to the control group ($p = 0,002$). Post Anesthesia Handover Register using SBAR can improve communication during handover in the PACU to prevent hypoxia.

Keyword : Anesthesia, Handover, Miscommunication, PACU, SBAR

1. Introduction

Communication is critical to providing safe patient care. Poor communication during handover is the main cause of preventable medical errors that impact patient safety (Jaulin et al, 2021). In Indonesia, it was found that of the 145 incidents reported by KNC (Nearly Injury Events) there were 69 cases (47.6%), KTD (Unexpected Events) were 67 cases (46.2%), and others were 9 cases (6.2%) (Erianti et al, 2023). According to the Ministry of Health (2020), in 2015 the number of adverse events increased to 41%, while in 2016 - 2017 it decreased, namely 35% and 28%. In 2018 - 2019 there was an increase, namely 30% and 31% (Kemenkes, 2020)..

One of the sentinel incidents that was widely reported was due to miscommunication. Miscommunication is caused by patient information errors, lack of communication, workload, distractions, and time constraints (Riesenberg et al, 2023). Communication in handover is an ongoing important thing in improving mutual service and patient safety. Many factors can contribute to errors during handover such as leadership, work team, closed communication, workload, or ability to communicate (Jaulin et al, 2021).

Handover (patient handover) is the process of transferring the main authority and responsibility for providing clinical care to patients from one care provider to another to ensure continuity of care through the process of exchanging information and transferring responsibility for patient care (Situmeang, 2023). Handover occurs at shift change and when patients are moved from one location to another, for example in the operating room, namely pre-operative, intra-operative and post-operative (PACU). After surgical intervention, the patient is usually transferred to the post-anesthesia care unit (PACU) where a handover takes place from the anesthesiologist who anesthetized the patient to the PACU nurse (Riesenberg et al, 2023).

Failure to handover from the operating room to the Post-Anaesthesia Care Unit (PACU) often occurs and can cause diagnostic and therapeutic delays and trigger side effects. To ensure safe patient care in the PACU, the Post Anesthesia Team Handover (PATH) must have competence in monitoring, measuring, interpreting and responding quickly to patients according to the level of care they provide (Arriaga et al, 2021). So that patients avoid post-operative complications.

One of the most dangerous postoperative complications is hypoxemia with an incidence rate of 38%, thereby increasing the morbidity and mortality of postoperative patients (Anduaem,

2022). The early postoperative period is a high risk time for hypoxemia. Postoperative hypoxemia may result from gas exchange problems during anesthesia, which may persist in the early postoperative period (Sharma, 2022). Undetected postoperative hypoxemia can cause pulmonary hypertension, hyperkalemia, respiratory and cardiac failure, even brain ischemia, and ultimately can lead to multiorgan failure (Riesenberg et al, 2023).

Structured communication tools will be useful for communicating patient information effectively, reducing adverse events, increasing patient safety, improving quality of care, and increasing health care provider satisfaction (Lee et al, 2020). Therefore, the communication tool used to improve communication according to standards is to use the SBAR (Situation, Background, Assessment, Recommendation) list for maximum information exchange during patient handover.

The use of the SBAR checklist in the operating room is beneficial in reducing morbidity and mortality. SBAR lists improve communication between team members at key steps throughout the surgical procedure and reduce surgical errors. Some studies have also recommended the use of checklists for patient handover, and this has improved the quantity and quality of information transmitted (Jaulin et al, 2021). The Post Anesthesia Team Handover (PATH) SBAR register aims to carry out secure information transmission so that stakeholders avoid any interference during the handover (Arriaga et al, 2021).

This handover checklist is used as a cognitive aid to reduce mental workload and make it easier to ensure safe transfer of information between the anesthesia team and PACU nurses. The research Jaulin's (2021) in the British Journal of Anesthesia shows that the use of the Post-Anaesthesia Team Handover (PATH) protocol is associated with fewer hypoxic events in the PACU, reduced handover interruptions, and improved communication. Researchers stated that the control group was 5.6 times more likely to experience severe hypoxemia (<90% for at least 30 seconds) than patients in the PATH group. This study assessed the impact of intervention on patients with the result of a significant reduction of $p < 0.0001$.

Implementation of PATH was associated with a 50% reduction in handover interruptions and a 30% reduction in PACU nurse calls to the operations team requesting additional information. It is now well known that interruptions during important transfers or procedures are common and contribute significantly to miscommunication and errors. Safer patient monitoring may be one of the reasons for reduced hypoxemia in the PATH group (Jaulin et al, 2021).

Based on the background above, researchers are interested in researching the effect of Post-Anaesthesia Team Handover (PATH) on the incidence of hypoxia in the Post-Anesthesia Care Unit (PACU) at RSI Siti Rahmah Padang.

2. Method

This research is a quantitative research method, Quasi Experimental research type with a pretest-posttest research design with control group design. This study was divided into 2 groups, namely the intervention group carried out the PATH protocol using the SBAR list and the control group carried out the handover protocol according to the hospital SOP. The independent variable in this study is Post Anesthesia Team Handover (PATH) using the SBAR list and the dependent variable is hypoxia by measuring it using pulse oximetry to see the patient's oxygen saturation.

This research was conducted in the operating room at RSI Siti Rahmah Padang. The population in this study were all surgical patients at RSI Siti Rahmah Padang. The research sample was 68 respondents, namely 34 intervention groups and 34 control groups. Purposive sampling technique with inclusion criteria: willing to be a respondent, adult patients aged 26 -65 years, ASA I and II. Exclusion criteria: patients who experienced diseases of the respiratory system/acute or chronic respiratory failure before surgery. Analysis of this research data is univariate analysis to determine the frequency distribution of research variables and bivariate analysis to test hypotheses using the Mann Whitney test to see the effect between the intervention group and the control group. This researcher

complies with ethical principles by guaranteeing the confidentiality of respondent data and using the data obtained only for this research.

3. Results and Discussion

Table 1
Frequency Distribution and Percentage Characteristics of Respondents in the Intervention Group and Control Group (n=68)

Karakteristik Responden	Kelompok			
	Intervensi (n= 34)		Kontrol (n= 34)	
	f	%	f	%
Age :				
Early adulthood	6	17,6	5	14,7
Late adulthood	8	23,5	9	26,5
Early seniors	11	32,4	12	35,3
Late seniors	9	26,5	8	23,5
Gender :				
Man	13	38,2	20	58,8
Woman	21	61,8	14	41,2
ASA :				
ASA I	10	29,4	6	17,6
ASA II	24	70,6	28	82,4
Anesthesia Technique:				
General Anesthesia	19	55,9	20	58,8
Spinal Anesthesia	15	44,1	14	41,2

Source: Data Processing

Based on Table 1, the general characteristics of respondents between the intervention group and the control group are known. In the intervention group, the most common age group was early elderly, 11 people (32.4%), with the most common gender being women, 21 people (61.8%), ASA II, 24 people (70.6%), and The most common type of anesthesia was spinal anesthesia, 21 people (61.8%). Meanwhile, in the control group, it was found that the most common age group was early elderly, 12 people (35.3%), with the largest gender being male, 20 people (58.8%), ASA II, 28 people (82.4%).), and the most common type of anesthesia was general anesthesia as many as 20 people (58.8%).

Table 2
Frequency Distribution and Percentage of Oxygen Levels in the Intervention Group and Control Group (n=68)

Kategori	Intervensi		Kontrol	
	f	%	f	%
Normal	20	58,8	9	26,5
Mild Hypoxia	14	41,2	20	58,8
Moderate Hypoxia	-	2,9	5	14,7

Jumlah	34	100	34	100
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Source: Data Processing

Based on Table 2, it is known that oxygen levels in the intervention group after administering the PATH intervention were mostly classified as normal, namely 20 people (58.8%), while in the control group the highest were mild hypoxia, namely 20 people (58.8%).

Table 3
Effect of Oxygen Levels in the Intervention Group and Control Group (n=68)

Kelompok	N	Mean Rank	p
Intervention	34	27,97	0.002
Control	34	41,03	

Source: Data Processing

Based on Table 3, the results of the Mann Whitney test analysis in the intervention group and control group are known. These results explain that the intervention group and the control group experienced differences in the mean (mean rank) of oxygen levels, the control group showed the possibility of being more severe than the intervention group. This is proven by the p value of $0.002 < 0.05$, so it can be concluded that there is an influence on oxygenation levels in the intervention group and control group.

Hypoxemia is defined as low levels of oxygen in the blood. The early postoperative period is a critical time for hypoxemia to occur. It is well known that patients' physiological responses do not recover quickly after anesthesia and surgery. Supplemental oxygen should be considered in patients undergoing surgery with postoperative anesthesia (Melesse, 2020). Hypoxemia can result in respiratory arrest or cause the victim to experience neurological defects. Lung function almost always worsens during anesthesia. This deterioration may be due to decreased functional residual capacity and increased airway closure, ventilation/perfusion (V/Q) imbalance, or development of atelectasis (Andualem et al, 2022).

There are various factors that influence the incidence of postoperative hypoxemia in the PACU. Patient age, preoperative oxygen saturation, type of anesthesia, pain level, and postoperative muscle strength were independent risk factors for postoperative hypoxemia in this study (Tang et al, 2019). Postoperative hypoxemia occurs due to inadequate lung expansion, reduced chest wall, and diaphragmatic activity caused by surgical injuries and pain, hemodynamic disturbances, and residual effects of anesthetic drugs (especially residual neuromuscular blockade), which can cause atelectasis, a ventilation-perfusion mismatch, alveolar hypoventilation, and impaired upper airway patency (Suzuki et al, 2020). Therefore, prolonged hypoxemia can have serious consequences, including arrhythmia, myocardial ischemia, and cognitive dysfunction.

Postoperative hypoxemia occurs due to impaired gas exchange during anesthesia as a result of a decrease in chest wall muscle tone that persists into the postoperative period (Andualem et al, 2022). Oximetry is commonly used to monitor the diagnosis of hypoxemia. The normal oximeter should always be 95 to 100% during anesthesia and recovery from anesthesia in the PACU room. If oxygen saturation is 94% or lower, the patient has hypoxemia and requires immediate treatment. Saturation less than 90% is a clinical emergency in postoperative patients. Diagnosis of hypoxemia with the help of a pulse oximeter will lead to early prevention of hypoxemia (Taye et al, 2021).

Postoperative oxygen administration can prevent hypoxemia. Therefore, appropriate monitoring is necessary at the time of handover, including SpO₂, and oxygen titration must be carried out during oxygen administration to maintain normoxemia while the patient is in the PACU (Suzuki et al, 2020). This is in accordance with research conducted by Jaulin (2021) entitled Standardized handover process with checklist improves quality and safety of care in the postanesthesia care unit: the Postanesthesia Team Handover trial. that

patients in the PATH group were 5.6 times less likely to experience hypoxaemia than patients in the control group. The handover process in the PATH checklist group also had significantly fewer disruptions (38.6% control vs 20.7% PATH; OR=2.5 [95% CI: 1.7-3.7]; $P < 0,0001$). This shows that the application of the PATH checklist to postoperative patients is associated with a reduction in the incidence of hypoxemia in the PACU.

Information regarding perioperative handover during anesthesia is still limited and is carried out verbally from the intraoperative room to the PACU room. The use of the postoperative PATH list for handover between the anesthesiologist and PACU nurse will increase the amount of information transfer during patient handover in the PACU thereby increasing the number of patient information items handed over from the anesthesiologist to the PACU nurse (Arriaga et al, 2021). The PATH intervention is used to reduce handover interruptions and increase information transfer in providing patient safety messages in improving patient care. Research aligns with patient safety principles to improve communication at handover using the PATH list (Jaulin et al, 2021).

This study is also consistent with other literature regarding postanesthesia handoff. In a prospective observational study of a checklist to standardize handover from the operating room to the PACU, researchers observed a significant increase in the amount of critical information shared during the handover process (Burns et al, 2018). In a prospective cohort study of postoperative handover to the intensive care unit, a handover protocol in communication implemented at the bedside using information templates, the authors observed a significant reduction in information omissions (Abraham et al, 2021).

The Anesthesia Patient Safety Foundation (APSF) has issued consensus recommendations regarding perioperative handoffs, including the statement that 'handoffs should have a structured or standardized process. All participants should receive handoff education and training and site-specific checklists or cognitive aids should be used to assist with the transfer of handoff information (Agarwala et al, 2019). Nonetheless, there is no universal standard of care for any checklist used during post-anesthesia handoff.

Based on research that has been conducted, handover using the PATH list using SBAR shows a decrease in the incidence of hypoxia in the PACU room. During the research, it was seen that the information obtained during the handover from the intra-operative room to the PACU was recorded in SBAR format, although at the time of the research it was still found to be written briefly which was a limitation in this research.

4. Conclusions

Post Anesthesia Handover Register using SBAR can improve communication during handover in the PACU room thereby preventing hypoxia. Based on the research results, it is hoped that handover using SBAR can be implemented and it is necessary to increase the knowledge of health workers during handover through continuous education and training, so that they can use SBAR during handover.

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